L 12

```
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
   SSSSSSSSSSSS  YYY         YYY     SSSSSSSSSSSS
SSS              YYY         YYY  SSS
SSS              YYY         YYY  SSS
SSS              YYY         YYY  SSS
SSS                 YYY   YYY     SSS
SSS                 YYY   YYY     SSS
SSS                 YYY   YYY     SSS
   SSSSSSSSS           YYY           SSSSSSSSS
   SSSSSSSSS           YYY           SSSSSSSSS
   SSSSSSSSS           YYY           SSSSSSSSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
            SSS        YYY                    SSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
SSSSSSSSSSSS           YYY        SSSSSSSSSSSS
```

```
                                                                      F  5
**FILE**ID**SYSCVRTIM
```

```
  SSSSSSSS  YY      YY    SSSSSSSS    CCCCCCCC  VV      VV  RRRRRRRR    TTTTTTTTTT    IIIIII    MM      MM
  SSSSSSSS  YY      YY    SSSSSSSS    CCCCCCCC  VV      VV  RRRRRRRR    TTTTTTTTTT    IIIIII    MM      MM
SS          YY      YY  SS          CC          VV      VV  RR      RR      TT          II      MMMM  MMMM
SS          YY      YY  SS          CC          VV      VV  RR      RR      TT          II      MMMM  MMMM
SS            YY  YY    SS          CC          VV      VV  RR      RR      TT          II      MM  MM  MM
SS            YY  YY    SS          CC          VV      VV  RR      RR      TT          II      MM  MM  MM
  SSSSSS        YY        SSSSSS    CC          VV      VV  RRRRRRRR        TT          II      MM      MM
  SSSSSS        YY        SSSSSS    CC          VV      VV  RRRRRRRR        TT          II      MM      MM
        SS      YY              SS  CC          VV      VV  RR  RR          TT          II      MM      MM
        SS      YY              SS  CC          VV      VV  RR  RR          TT          II      MM      MM
        SS      YY              SS  CC            VV  VV    RR    RR        TT          II      MM      MM      ....
        SS      YY              SS  CC            VV  VV    RR    RR        TT          II      MM      MM      ....
SSSSSSSS        YY      SSSSSSSS      CCCCCCCC      VV      RR      RR      TT        IIIIII    MM      MM      ....
SSSSSSSS        YY      SSSSSSSS      CCCCCCCC      VV      RR      RR      TT        IIIIII    MM      MM      ....

LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

Table of contents

```
0000        .TITLE  SYSCVRTIM - SYSTEM SERVICES TO CONVERT TIME
0000        .IDENT  'V04-000'
0000
0000  ;
0000  ;****************************************************************************
0000  ;*                                                                          *
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0000  ;*                                                                          *
0000  ;*                                                                          *
0000  ;****************************************************************************
0000  ;
0000  ; D. N. CUTLER 6-JAN-76
0000  ;
0000  ; SYSTEM SERVICES TO CONVERT TIME
0000  ;
0000  ;       CONVERT BINARY TIME TO ASCII STRING
0000  ;       CONVERT ASCII STRING TO BINARY TIME
0000  ;       CONVERT BINARY TIME TO NUMERIC FORMAT
0000  ;
0000  ;       THE CONVERSION ALGORITHMS USED HEREIN WERE DEVELOPED BY P. CONKLIN,
0000  ;       M. SPIER, AND D. ROSENBERY ON THE PDP-10.
0000  ;
0000  ; MODIFIED BY:
0000  ;
0000  ;       V03-001 KDM0086         Kathleen D. Morse       02-Apr-1982
0000  ;               Correctly acquire system time, even in case where
0000  ;               secondary processor is accessing EXE$GQ_SYSTIME while
0000  ;               the primary processor is updating it (11/782 case).
0000  ;
0000  ;       V02-004 ROW37307        Ralph O. Weber          27-Jul-1981
0000  ;               Fix EXE$BINTIM to treat decimal point preceeding hundredths of
0000  ;               a second field as a true decimal point.  IE: to cause 0:0:0.1
0000  ;               to convert to 1 tenth of a second rather than to 1 hundredth
0000  ;               of a second.  Also allow indefinite length fractional value
0000  ;               fields.  Use the thousandths digit to round the hundredths
0000  ;               value, and ignore all digits following the thousandths digit.
0000  ;               The entire field, upto the first trailing blank, is still
0000  ;               processed.  Therefore, non-numeric characters in the
0000  ;               fractional seconds field will still produce an Invalid Time
0000  ;               return code.
0000  ;
```

```
                  0000  ;           V02-003 TCM0001         Trudy C. Matthews       03-Jun-1981
                  0000  ;                   Fix CONVERT subroutine in EXE$BINTIM to ignore blanks.  This
                  0000  ;                   fix allows trailing blanks after a truncated time field.
                  0000  ;
                  0000  ;
                  0000  ;
                  0000  ; MACRO LIBRARY CALLS
                  0000  ;
                  0000
                  0000          $SSDEF                                  ;DEFINE SYSTEM STATUS VALUES
                  0000
                  0000  ;
                  0000  ; LOCAL SYMBOLS
                  0000  ;
                  0000  ; ARGUMENT LIST OFFSET DEFINTIONS FOR CONVERT BINARY TIME TO ASCII STRING
                  0000  ;
                  0000
        00000004  0000  ATIMLEN=4                                       ;ADDRESS OF WORD TO STORE LENGTH
        00000008  0000  ATIMBUF=8                                       ;ADDRESS OF OUTPUT BUFFER DESCRIPTOR
        0000000C  0000  ATIMADR=12                                      ;ADDRESS OF 64-BIT ABSOLUTE OR DELTA TIME
        00000010  0000  ACVTFLG=16                                      ;CONVERSION INDICATOR
                  0000
                  0000  ;
                  0000  ; ARGUMENT LIST OFFSET DEFINITIONS FOR CONVERT ASCII STRING TO BINARY TIME
                  0000  ;
                  0000
        00000004  0000  BTIMBUF=4                                       ;ADDRESS OF ASCII STRING DESCRIPTOR
        00000008  0000  BTIMADR=8                                       ;ADDRESS TO STORE 64-BIT ABSOLUTE OR DELTA T
                  0000
                  0000  ;
                  0000  ; ARGUMENT LIST OFFSET DEFINITIONS FOR CONVERT BINARY TIME TO NUMERIC TIME
                  0000  ;
                  0000
        00000004  0000  NTIMBUF=4                                       ;ADDRESS OF 7-WORD BUFFER TO RECEIVE TIME
        00000008  0000  NTIMADR=8                                       ;ADDRESS OF 64-BIT ABSOLUTE OR DELTA TIME
                  0000
                  0000  ;
                  0000  ; CONVERSION CONSTANTS
                  0000  ;
                  0000  ; TOTAL DAYS IN A CENTURY
                  0000  ;
                  0000
        00008EAC  0000  CENTURYDAYS=<100*365>+<100/4>-<100/100> ;
                  0000
                  0000  ;
                  0000  ; AVERAGE QUARTER DAYS PER CENTURY
                  0000  ;
                  0000
        00023AB1  0000  QDAYSPCENT=<<<100*365>+<100/4>-<100/100>>*4>+<400/400> ;
                  0000
                  0000  ;
                  0000  ; AVERAGE QUARTER DAYS PER YEAR
                  0000  ;
                  0000
        000005B5  0000  QDAYSPYEAR=<365*4>+1                ;
                  0000
                  0000  ;
```

```
                 0000   ; TOTAL DAYS IN A QUADRICENTURY
                 0000   ;
                 0000
       00023AB1  0000   QUADRIDAYS=<400*365>+<400/4>-<400/100>+<400/400> ;
                 0000
                 0000   ;
                 0000   ; TOTAL DAYS IN A QUADYEAR
                 0000   ;
                 0000
       000005B5  0000   QUADYEARDAYS=<365*4>+1                          ;
                 0000
                 0000   ;
                 0000   ; OFFSET IN DAYS FROM 1-JAN-1501 TO 17-NOV-1858
                 0000   ;
                 0000
       0001FE98  0000   TIMOFF1=<<1858-1501>*365>+<<1858-1501>/4>-<<1858-1501>/100>+<<1858-1501>/400>+ -;
                 0000           31+28+31+30+31+30+31+31+30+31+17 ;
                 0000
                 0000   ;
                 0000   ; OFFSET IN DAYS FROM 1-JAN-1601 TO 17-NOV-1858
                 0000   ;
                 0000
                 0000   TIMOFF2=<<1858-1601>*365>+<<1858-1601>/4>-<<1858-1601>/100>+<<1858-1601>/400>+ -;
       00016FEC  0000           31+28+31+30+31+30+31+31+30+31+17 ;
                 0000
                 0000   ;
                 0000   ; CHARACTER CODE DEFINITIONS
                 0000   ;
                 0000
       00000020  0000   BLANK=32                                        ;
       0000003A  0000   COLON=58                                        ;
       0000002D  0000   HYPHEN=45                                       ;
       00000039  0000   NINE=57                                         ;
       00000030  0000   ONE=48                                          ;
       0000002E  0000   PERIOD=46                                       ;
                 0000
                 0000   ;
                 0000   ; NUMERIC TIME BUFFER OFFSET DEFINITIONS
                 0000   ;
                 0000
       00000000  0000   YEAR=0                                          ;
       00000002  0000   MONTH=2                                         ;
       00000004  0000   DAY=4                                           ;
       00000006  0000   HOUR=6                                          ;
       00000008  0000   MINUTE=8                                        ;
       0000000A  0000   SECOND=10                                       ;
       0000000C  0000   HUNDREDTH=12                                    ;
                 0000
                 0000   ;
                 0000   ; LOCAL DATA
                 0000   ;
                 0000   ; MONTH, DAY CONVERSION TABLE
                 0000   ;
             00000000           .PSECT  Y$EXEPAGED
                 0000   DATETABLE:                                      ;DATE CONVERSION TABLE
             1F  0000           .BYTE   31                              ;JANUARY
             1D  0001           .BYTE   29                              ;FEBRUARY
```

```
                          1F  0002   172              .BYTE   31                          ;MARCH
                          1E  0003   173              .BYTE   30                          ;APRIL
                          1F  0004   174              .BYTE   31                          ;MAY
                          1E  0005   175              .BYTE   30                          ;JUNE
                          1F  0006   176              .BYTE   31                          ;JULY
                          1F  0007   177              .BYTE   31                          ;AUGUST
                          1E  0008   178              .BYTE   30                          ;SEPTEMBER
                          1F  0009   179              .BYTE   31                          ;OCTOBER
                          1E  000A   180              .BYTE   30                          ;NOVEMBER
                          1F  000B   181              .BYTE   31                          ;DECEMBER
                              000C   182
                              000C   183      ;
                              000C   184      ; MONTH CONVERSION TABLE
                              000C   185      ;
                              000C   186
                              000C   187      MONTHTAB:                                   ;
                 4E 41 4A 03  000C   188              .ASCII  <3>/JAN/                    ;
                 42 45 46 03  0010   189              .ASCII  <3>/FEB/                    ;
                 52 41 4D 03  0014   190              .ASCII  <3>/MAR/                    ;
                 52 50 41 03  0018   191              .ASCII  <3>/APR/                    ;
                 59 41 4D 03  001C   192              .ASCII  <3>/MAY/                    ;
                 4E 55 4A 03  0020   193              .ASCII  <3>/JUN/                    ;
                 4C 55 4A 03  0024   194              .ASCII  <3>/JUL/                    ;
                 47 55 41 03  0028   195              .ASCII  <3>/AUG/                    ;
                 50 45 53 03  002C   196              .ASCII  <3>/SEP/                    ;
                 54 43 4F 03  0030   197              .ASCII  <3>/OCT/                    ;
                 56 4F 4E 03  0034   198              .ASCII  <3>/NOV/                    ;
                 43 45 44 03  0038   199              .ASCII  <3>/DEC/                    ;
                              003C   200
                              003C   201      ;
                              003C   202      ; HOURS, MINUTES, SECONDS, HUNDREDTHS CONVERSION TABLE
                              003C   203      ;
                              003C   204
                              003C   205      TIMETABLE:                                  ;TIME CONVERSION TABLE
                          64  003C   206              .BYTE   100                         ;HUNDREDTHS
                          3C  003D   207              .BYTE   60                          ;SECONDS
                          3C  003E   208              .BYTE   60                          ;MINUTES AND HOURS
                              003F   209
                              003F   210      ;
                              003F   211      ; CONVERSION CONTROL STRINGS
                              003F   212      ;
                              003F   213
5A 34 21 2D 43 41 21 2D 57 53 32 21  003F   214      DATE:   .ASCII  /!2SW-!AC-!4ZW /            ;
                          20 57  004B
               20 57 53 34 21  004D   215      DELTA:  .ASCII  /!4SW /                     ;
32 21 3A 57 5A 32 21 3A 57 5A 32 21  0052   216      TIME:   .ASCII  /!2ZW:!2ZW:!2ZW.!2ZW/       ;
         57 5A 32 21 2E 57 5A  005E
```

```
                  0065          .SBTTL  CONVERT BINARY TIME TO ASCII STRING
                  0065  ;+
                  0065  ; EXE$ASCTIM - CONVERT BINARY TIME TO ASCII STRING
                  0065  ;
                  0065  ; THIS SERVICE PROVIDES THE CAPABILITY TO CONVERT AN ABSOLUTE OR DELTA
                  0065  ; TIME FROM 64-BIT FORMAT TO AN ASCII STRING.
                  0065  ;
                  0065  ; INPUTS:
                  0065  ;
                  0065  ;       ATIMLEN(AP) = ADDRESS OF WORD TO RECEIVE OUTPUT LENGTH.
                  0065  ;       ATIMBUF(AP) = ADDRESS OF OUTPUT BUFFER DESCRIPTOR.
                  0065  ;       ATIMADR(AP) = ADDRESS OF 64-BIT TIME VALUE. IF ZERO, THEN THE CURRENT
                  0065  ;               SYSTEM TIME IS USED. POSITIVE VALUES ARE INTERPRETED AS
                  0065  ;               ABSOLUTE TIMES AND NEGATIVE VALUES AS DELTA TIMES.
                  0065  ;       ACVTFLG(AP) = CONVERSION INDICATOR.
                  0065  ;               LOW BIT CLEAR INDICATES BOTH DATE AND TIME ARE TO BE CON-
                  0065  ;                       VERTED.
                  0065  ;               LOW BIT SET INDICATES ONLY TIME IS TO BE CONVERTED.
                  0065  ;
                  0065  ; OUTPUTS:
                  0065  ;
                  0065  ;       R0 LOW BIT CLEAR INDICATES FAILURE TO CONVERT TIME TO ASCII.
                  0065  ;
                  0065  ;               R0 = SS$_ACCVIO - 64-BIT TIME VALUE OR OUTPUT BUFFER DESCRIPTOR
                  0065  ;                       CANNOT BE READ BY CALLING ACCESS MODE, OR OUTPUT BUFFER
                  0065  ;                       CANNOT BE WRITTEN BY CALLING ACCESS MODE.
                  0065  ;
                  0065  ;               R0 = SS$_IVTIME - SPECIFIED DELTA TIME IS GREATER THAN 9999
                  0065  ;                       DAYS.
                  0065  ;
                  0065  ;       R0 LOW BIT SET INDICATES SUCCESSFUL COMPLETION.
                  0065  ;
                  0065  ;               R0 = SS$_NORMAL - NORMAL COMPLETION.
                  0065  ;-
                  0065
                  0065  EXE$ASCTIM::                                  ;CONVERT TIME TO ASCII
            007C  0065          .WORD   ^M<R2,R3,R4,R5,R6>            ;ENTRY MASK
 7E   08 BC   7D  0067          MOVQ    @ATIMBUF(AP),-(SP)            ;SAVE OUTPUT BUFFER DESCRIPTOR
    56   5E   D0  006B          MOVL    SP,R6                         ;SAVE ADDRESS OF OUTPUT BUFFER DESCRIPTOR
         7E   D4  006E          CLRL    -(SP)                         ;CLEAR SPACE FOR LENGTH FROM FAO
    55   5E   D0  0070          MOVL    SP,R5                         ;SAVE ADDRESS OF LENGTH
         52   D4  0073          CLRL    R2                            ;ASSUME ABSOLUTE TIME SPECIFIED
 53   0C AC   D0  0075          MOVL    ATIMADR(AP),R3                ;GET ADDRESS OF 64-BIT TIME VALUE
         07   13  0079          BEQL    10$                           ;IF EQL NONE SPECIFIED
    50   63   7D  007B          MOVQ    (R3),R0                       ;GET 64-BIT TIME VALUE
         02   18  007E          BGEQ    10$                           ;IF GEQ ABSOLUTE TIME
         52   D6  0080          INCL    R2                            ;INDICATE DELTA TIME
    5E   10   C2  0082  10$:    SUBL    #<<<7*2>+3>/4>*4,SP           ;ALLOCATE NUMERIC TIME BUFFER
    54   5E   D0  0085          MOVL    SP,R4                         ;SAVE ADDRESS OF NUMERIC TIME BUFFER
                  0088          $NUMTIM_S (R4),(R3)                   ;CONVERT TIME TO NUMERIC FORMAT
      6F 50   E9  0093          BLBC    R0,60$                        ;IF LBC CONVERSION FAILURE
                  0096
                  0096  ;
                  0096  ; CONVERT TIME TO ASCII FORMAT
                  0096  ;
                  0096
   3E 10 AC   E8  0096          BLBS    ACVTFLG(AP),40$               ;IF LBS ONLY TIME IS TO BE CONVERTED
```

```
          12 52   E8  009A   275             BLBS    R2,20$                          ;IF LBS DELTA TIME SPECIFIED
                      009D   276
                      009D   277 ;
                      009D   278 ; CONVERT DATE
                      009D   279 ;
                      009D   280
      52    02 A4   3C  009D   281             MOVZWL  MONTH(R4),R2                    ;GET NUMERIC MONTH VALUE
 52   FF62 CF42   DE  00A1   282             MOVAL   W^MONTHTAB-4[R2],R2             ;GET ADDRESS OF MONTH COUNTED STRING
         FF94 CF   DF  00A7   283             PUSHAL  W^DATE                          ;BUILD DESCRIPTOR FOR CONTROL STRING
              0E   DD  00AB   284             PUSHL   #DELTA-DATE                     ;
              06   11  00AD   285             BRB     30$                             ;
                      00AF   286
                      00AF   287 ;
                      00AF   288 ; CONVERT DELTA TIME
                      00AF   289 ;
                      00AF   290
         FF9A CF   DF  00AF   291 20$:        PUSHAL  W^DELTA                         ;BUILD CONTROL STRING DESCRIPTOR
              05   DD  00B3   292             PUSHL   #TIME-DELTA                     ;
      51      5E   D0  00B5   293 30$:        MOVL    SP,R1                           ;COPY ADDRESS OF CONTROL STRING DESCRIPTOR
                      00B8   294             $FAO_S  (R1),(R5),(R6),DAY(R4),R2,YEAR(R4) ;CONVERT DELTA TIME OR DATE
           36 50   E9  00CC   295             BLBC    R0,60$                          ;IF LBC CONVERT FAILURE
      66      65   A2  00CF   296             SUBW    (R5),(R6)                       ;ANY SPACE LEFT IN TIME BUFFER?
              27   15  00D2   297             BLEQ    50$                             ;IF LEQ NO
   04 A6      65   C0  00D4   298             ADDL    (R5),4(R6)                      ;UPDATE TIME BUFFER ADDRESS
                      00D8   299
                      00D8   300 ;
                      00D8   301 ; CONVERT TIME
                      00D8   302 ;
                      00D8   303
         FF76 CF   DF  00D8   304 40$:        PUSHAL  W^TIME                          ;BUILD CONTROL STRING DESCRIPTOR
              13   DD  00DC   305             PUSHL   #EXE$ASCTIM-TIME                ;
      51      5E   D0  00DE   306             MOVL    SP,R1                           ;COPY ADDRESS OF CONTROL STRING DESCRIPTOR
                      00E1   307             $FAO_S  (R1),2(R5),(R6),HOUR(R4),MINUTE(R4),SECOND(R4),HUNDREDTH(R4) ;
   51      04 AC   D0  00FB   308 50$:        MOVL    ATIMLEN(AP),R1                  ;LENGTH ADDRESS SPECIFIED?
              04   13  00FF   309             BEQL    60$                             ;IF EQL NO
 61     65    85   A1  0101   310             ADDW3   (R5)+,(R5),(R1)                 ;COMPUTE AND RETURN OUTPUT LENGTH
                   04  0105   311 60$:        RET                                     ;
```

```
                             0106            .SBTTL  CONVERT ASCII STRING TO BINARY TIME
                             0106    ;+
                             0106    ; EXE$BINTIM - CONVERT ASCII STRING TO BINARY TIME
                             0106    ;
                             0106    ; THIS SERVICE PROVIDES THE CAPABILITY TO CONVERT AN ASCII STRING TO A
                             0106    ; 64-BIT ABSOLUTE OR DELTA TIME.
                             0106    ;
                             0106    ; INPUTS:
                             0106    ;
                             0106    ;       BTIMBUF(AP) = ADDRESS OF ASCII STRING DESCRIPTOR.
                             0106    ;       BTIMADR(AP) = ADDRESS TO STORE 64-BIT TIME VALUE.
                             0106    ;
                             0106    ; OUTPUTS:
                             0106    ;
                             0106    ;       RO LOW BIT CLEAR INDICATES FAILURE TO CONVERT TIME TO ASCII.
                             0106    ;
                             0106    ;               RO = SS$_IVTIME - ASCII STRING HAS INVALID SYNTAX OR TIME
                             0106    ;                       COMPONENT IS OUT OF RANGE.
                             0106    ;
                             0106    ;       RO LOW BIT SET INDICATES SUCCESSFUL COMPLETION.
                             0106    ;
                             0106    ;               RO = SS$_NORMAL - NORMAL COMPLETION.
                             0106    ;-
                             0106
                             0106    EXE$BINTIM::                                    ;CONVERT ASCII STRING TO BINARY TIME
                       01FC  0106            .WORD   ^M<R2,R3,R4,R5,R6,R7,R8> ;ENTRY MASK
               5E   10   C2  0108            SUBL    #<<<7*2>+3>/4>*4,SP             ;ALLOCATE NUMERIC TIME BUFFER
               57   5E   D0  010B            MOVL    SP,R7                           ;SAVE ADDRESS OF NUMERIC TIME BUFFER
             55  04 BC   7D  010E            MOVQ    @BTIMBUF(AP),R5                 ;GET ADDRESS AND LENGTH OF ASCII STRING
                    58   D4  0112            CLRL    R8                              ;ASSUME DELTA TIME
                    55   B7  0114    10$:    DECW    R5                              ;ANY MORE CHARACTERS?
                    64   19  0116            BLSS    30$                             ;IF LSS NO
               86   20   91  0118            CMPB    #BLANK,(R6)+                    ;SKIP LEADING BLANK?
                    F7   13  011B            BEQL    10$                             ;IF EQL YES
                    55   B6  011D            INCW    R5                              ;CORRECT NUMBER OF CHARACTERS
          76   55   2D   3A  011F            LOCC    #HYPHEN,R5,-(R6)                ;ABSOLUTE TIME FORMAT?
                    57   13  0123            BEQL    30$                             ;IF EQL NO
                    58   D6  0125            INCL    R8                              ;INDICATE ABSOLUTE TIME
                             0127            $NUMTIM_S (R7)                          ;CONVERT CURRENT TIME TO NUMERIC FORMAT
                             0132
                             0132    ;
                             0132    ; CONVERT ABSOLUTE TIME
                             0132    ;
                             0132
             54  04 A7   DE  0132            MOVAL   DAY(R7),R4                      ;SET ADDRESS TO STORE DAY
                  00B1   30  0136            BSBW    CONVERT                         ;CONVERT DAY FIELD
                         2D  0139            .BYTE   HYPHEN                          ;EXPECTED TERMINATOR
                    55   B5  013A            TSTW    R5                              ;ANY MORE CHARACTERS?
                    03   12  013C            BNEQ    11$                             ;BRNCH IF THERE ARE MORE CHARACTERS.
                  00DB   31  013E            BRW     CVRTIME                         ;IF NO MORE CHARACTERS, CONVERT TIME.
               86   2D   91  0141    11$:    CMPB    #HYPHEN,(R6)+                   ;MONTH FIELD VOID?
                    2F   13  0144            BEQL    20$                             ;IF EQL YES
FEBF CF   30   76   03   39  0146            MATCHC  #3,-(R6),#4*12,W^MONTHTAB ;SEARCH FOR MONTH SUBSTRING MATCH
                    03   13  014D            BEQL    14$                             ;SKIP ERROR BRANCH IF MATCH FOUND
                  0092   31  014F            BRW     IVTIME                          ;IF NEQ NO MATCH FOUND
          52   30   52   C3  0152    14$:    SUBL3   R2,#4*12,R2                     ;CALCULATE CHARACTERS TO START OF SUBSTRING
               52   03   D3  0156            BITL    #3,R2                           ;MULTIPLE OF 4?
```

```
                03  13  0159        BEQL    16$                     ;BRANCH IF MULTIPLE OF 4
              0086  31  015B        BRW     IVTIME                  ;IF NOT MULTIPLE OF 4, THEN ERROR
   02 A7   52   04  A7  015E 16$:   DIVW3   #4,R2,MONTH(R7)         ;CONVERT TO MONTH AND STORE
           56   03  C0  0163        ADDL    #3,R6                   ;UPDATE ADDRESS OF ASCII STRING
           55   03  A2  0166        SUBW    #3,R5                   ;UPDATE COUNT OF REMAINING CHARACTERS
                79  19  0169        BLSS    IVTIME                  ;IF LSS INVALID SYNTAX
                03  14  016B        BGTR    18$                     ;IF GTR CHARACTERS REMAINING
              00AC  31  016D        BRW     CVRTIME                 ;OTHERWISE END OF STRING
           86   2D  91  0170 18$:   CMPB    #HYPHEN,(R6)+           ;FIELD TERMINATED PROPERLY?
                6F  12  0173        BNEQ    IVTIME                  ;IF NEQ NO
                55  B7  0175 20$:   DECW    R5                      ;DECREMENT COUNT OF REMAINING CHARACTERS
           54   67  DE  0177        MOVAL   YEAR(R7),R4             ;SET ADDRESS TO STORE YEAR
                0A  11  017A        BRB     40$                     ;
                        017C
                        017C ;
                        017C ; CONVERT DELTA TIME
                        017C ;
                        017C
           54   67  DE  017C 30$:   MOVAL   YEAR(R7),R4             ;GET ADDRESS TO STORE YEAR
                84  D4  017F        CLRL    (R4)+                   ;CLEAR YEAR AND MONTH
                64  7C  0181        CLRQ    (R4)                    ;CLEAR DAY, HOUR, MINUTE, AND SECOND
             0C A7  B4  0183        CLRW    HUNDREDTH(R7)           ;CLEAR HUNDREDTH
                62  10  0186 40$:   BSBB    CONVERT                 ;CONVERT RELATIVE DAY OR YEAR FIELD
                20      0188        .BYTE   BLANK                   ;EXPECTED TERMINATOR
                55  B7  0189 50$:   DECW    R5                      ;ANY REMAINING CHARACTERS?
                03  18  018B        BGEQ    53$                     ;BRANCH IF CHARACTERS REMAINING
              008C  31  018D        BRW     CVRTIME                 ;ELSE GO PROCESS WHAT WE'VE GOT
           86   20  91  0190 53$:   CMPB    #BLANK,(R6)+            ;NEXT CHARACTER BLANK?
                F4  13  0193        BEQL    50$                     ;IF EQL YES
                56  D7  0195        DECL    R6                      ;BACK UP TO NONBLANK CHARACTER
                55  D6  0197        INCL    R5                      ;ADJUST REMAINING CHARACTER COUNT
                        0199
                        0199 ;
                        0199 ; CONVERT TIME
                        0199 ;
                        0199
      54   06 A7    DE  0199        MOVAL   HOUR(R7),R4             ;SET ADDRESS TO STORE HOUR
                4B  10  019D        BSBB    CONVERT                 ;CONVERT HOUR FIELD
                3A      019F        .BYTE   COLON                   ;EXPECTED TERMINATOR
                48  10  01A0        BSBB    CONVERT                 ;CONVERT MINUTE FIELD
                3A      01A2        .BYTE   COLON                   ;EXPECTED TERMINATOR
                45  10  01A3        BSBB    CONVERT                 ;CONVERT SECOND FIELD
                2E      01A5        .BYTE   PERIOD                  ;EXPECTED TERMINATOR
                        01A6
                        01A6                                        ;Convert Hundredth Field
                        01A6                                        ;This must be done differently because
                        01A6                                        ;this is a fractional value.
                        01A6                                        ;Establish max useable digits,
           53   03  D0  01A6        MOVL    #3, R3                  ;including the rounding digit.
                64  B4  01A9        CLRW    (R4)                    ;Clear accumulated value.
                55  B7  01AB 70$:   DECW    R5                      ;Any more characters?
                2C  19  01AD        BLSS    80$                     ;Branch if no more characters.
           51   86  9A  01AF        MOVZBL  (R6)+, R1               ;Get the next character.
           20   51  91  01B2        CMPB    R1, #BLANK              ;A blank marks the end of the field.
                24  13  01B5        BEQL    80$                     ;Branch if at end of the field.
           51   30  C2  01B7        SUBL    #ONE, R1                ;Subtract out character bias.
                28  19  01BA        BLSS    IVTIME                  ;Branch if invalid character.
```

```
        51   09   D1  01BC               CMPL    #NINE-ONE, R1           ;Result value within digit range?
             23   19  01BF               BLSS    IVTIME                  ;Branch if invalid character.
      0B     53   F5  01C1               SOBGTR  R3, 73$                 ;Branch if using this digit directly.
             E5   19  01C4               BLSS    70$                     ;Branch if ignoring this digit.
        51   05   D1  01C6               CMPL    #5, R1                  ;Else digit as the rounding digit.
             E0   14  01C9               BGTR    70$                     ;Branch if rounding has no effect.
             64   B6  01CB               INCW    (R4)                    ;If rounding up, do it.
             DC   11  01CD               BRB     70$                     ;Then loop, but for a regular digit,
        64   0A   A4  01CF       73$:    MULW    #10, (R4)               ;multiply partial result by 10.
             10   1D  01D2               BVS     IVTIME                  ;An overflow means an invalid time.
        64   51   A0  01D4               ADDW    R1, (R4)                ;Accumulate fracitonal value.
             0B   1D  01D7               BVS     IVTIME                  ;Overflow means invalid time.
             D0   11  01D9               BRB     70$                     ;Loop till end occurs.
                      01DB
             53   D7  01DB       80$:    DECL    R3                      ;Insure that truncated digits are
             3D   15  01DD               BLEQ    CVRTIME                 ;included as zeros in the final
        64   0A   A4  01DF               MULW    #10, (R4)               ;fractional (hundredths) field value.
             F7   11  01E2               BRB     80$                     ;NB: this will always overflow a word
                      01E4                                               ;if the fractional field has a
                      01E4                                               ;resolution greater than thousandths.
                      01E4       ;
                      01E4       ; INVALID SYNTAX OR TIME COMPONENT
                      01E4       ;
                      01E4
  50    0184 8F   3C  01E4       IVTIME: MOVZWL  #SS$_IVTIME,R0          ;SET INVALID TIME
                  04  01E9               RET
                      01EA
                      01EA       ;
                      01EA       ; SUBROUTINE TO CONVERT NUMERIC FIELD TO BINARY
                      01EA       ;
                      01EA
                      01EA       CONVERT:                                ;CONVERT FIELD
             50   D4  01EA               CLRL    R0                      ;CLEAR ACCUMULATED VALUE
             84   B5  01EC       10$:    TSTW    (R4)+                   ;POINT PAST NEXT FIELD
             55   B7  01EE       11$:    DECW    R5                      ;ANY MORE CHARACTERS?
             2A   19  01F0               BLSS    CVRTIME                 ;IF LSS NO
        51   86   9A  01F2               MOVZBL  (R6)+,R1                ;GET NEXT CHARACTER
     00 BE   51   91  01F5               CMPB    R1,@(SP)                ;EXPECTED TERMINATOR?
             1E   13  01F9               BEQL    20$                     ;IF EQL YES
        20   51   91  01FB               CMPB    R1,#BLANK               ;BLANK CHARACTER?
             EE   13  01FE               BEQL    11$                     ;IGNORE BLANKS
        51   30   C2  0200               SUBL    #ONE,R1                 ;SUBTRACT OUT CHARACTER BIAS
             DF   19  0203               BLSS    IVTIME                  ;IF LSS INVALID CHARACTER
        51   09   D1  0205               CMPL    #NINE-ONE,R1            ;RESULT VALUE WITHIN RANGE?
             DA   19  0208               BLSS    IVTIME                  ;IF LSS INVALID CHARACTER
        50   0A   A4  020A               MULW    #10,R0                  ;MULTIPLY PARTIAL RESULT BY 10
             D5   1D  020D               BVS     IVTIME                  ;IF VS INVALID TIME
        50   51   A0  020F               ADDW    R1,R0                   ;ACCUMULATE VALUE
             D0   1D  0212               BVS     IVTIME                  ;IF VS INVALID TIME VALUE
        74   50   B0  0214               MOVW    R0,-(R4)                ;STORE VALUE
             D3   11  0217               BRB     10$                     ;
             6E   D6  0219       20$:    INCL    (SP)                    ;INCREMENT PAST TERMINATOR
                  05  021B               RSB                             ;
                      021C
                      021C       ;
                      021C       ; CHECK CONVERTED DATE AND TIME VALUES
                      021C       ;
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                                          021C
                                          021C   CVRTIME:                                        ;
             04 A7    270F 8F        B1   021C                CMPW     #9999,DAY(R7)               ;DAY WITHIN UPPER LIMIT?
                              C0     1F   0222                BLSSU    IVTIME                      ;IF LSSU NO
                   06 A7      18     B1   0224                CMPW     #24,HOUR(R7)                ;HOUR WITHIN LIMITS?
                              BA     1B   0228                BLEQU    IVTIME                      ;IF LEQU NO
                   08 A7      3C     B1   022A                CMPW     #60,MINUTE(R7)              ;MINUTE WITHIN LIMITS?
                              B4     1B   022E                BLEQU    IVTIME                      ;IF LEQU NO
                   0A A7      3C     B1   0230                CMPW     #60,SECOND(R7)              ;SECOND WITHIN LIMITS?
                              AE     1B   0234                BLEQU    IVTIME                      ;IF LEQU NO
                   55      04 A7     3C   0236                MOVZWL   DAY(R7),R5                  ;GET DAY VALUE
                           03 58     E8   023A                BLBS     R8,5$                       ;IF LBS ABSOLUTE TIME
                            0097     31   023D                BRW      40$                         ;
                                          0240
                                          0240   ;
                                          0240   ; CONVERT YEARS TO QUADRICENTURIES, CENTURIES, QUADYEARS, YEARS
                                          0240   ;
                                          0240
                              A2     13   0240   5$:          BEQL     IVTIME                      ;IF EQL INVALID TIME
                         50   67     3C   0242                MOVZWL   YEAR(R7),R0                 ;GET YEAR VALUE
                   50    F9BF C0     3E   0245                MOVAW    -1601(R0),R0                ;CALCULATE YEARS PAST 1601
                              98     19   024A                BLSS     IVTIME                      ;IF LSS INVALID TIME
                              51     D4   024C                CLRL     R1                          ;CLEAR HIGH PART OF DIVIDEND
   51    50    50   00000190 8F      7B   024E                EDIV     #400,R0,R0,R1               ;CALCULATE QUADRICENTURIES
                              52     D4   0257                CLRL     R2                          ;CLEAR HIGH PART OF DIVIDEND
   52    51    51   00000064 8F      7B   0259                EDIV     #100,R1,R1,R2               ;CALCULATE CENTURIES
                              53     D4   0262                CLRL     R3                          ;CLEAR HIGH PART OF DIVIDEND
         53    52    52       04     7B   0264                EDIV     #4,R2,R2,R3                 ;CALCULATE QUADYEARS AND YEARS
                                          0269
                                          0269   ;
                                          0269   ; CONVERT QUADRICENTURIES, CENTURIES, QUADYEARS, YEARS TO DAYS
                                          0269   ;
                                          0269
                   53    016D 8F     A4   0269                MULW     #365,R3                     ;CALCULATE NUMBER OF DAYS PAST LEAP YEAR
   52    53    52   000005B5 8F      7A   026E                EMUL     #QUADYEARDAYS,R2,R3,R2      ;CALCULATE NUMBER OF QUADYEAR DAYS AND SUM
               51   00008EAC 8F      C4   0277                MULL     #CENTURYDAYS,R1             ;CALCULATE NUMBER OF CENTURY DAYS
   55    51    50   00023AB1 8F      7A   027E                EMUL     #QUADRIDAYS,R0,R1,R5        ;CALCULATE NUMBER OF QUADRIDAYS AND SUM
                              50     D4   0287                CLRL     R0                          ;CLEAR INITIAL LOOP INDEX
                   56      02 A7     3C   0289                MOVZWL   MONTH(R7),R6                ;GET SPECIFIED MONTH VALUE
                         55   52     C0   028D   10$:         ADDL     R2,R5                       ;ACCUMULATE TOTAL DAYS
              52     FD6B CF40       9A   0290                MOVZBL   W^DATETABLE[R0],R2          ;GET NUMBER OF DAYS IN MONTH
                         50   01     D1   0296                CMPL     #1,R0                       ;SECOND MONTH OF YEAR?
                              1E     12   0299                BNEQ     30$                         ;IF NEQ NO
                         53   67     3C   029B                MOVZWL   YEAR(R7),R3                 ;GET SPECIFIED YEAR VALUE
                         53   03     D3   029E                BITL     #3,R3                       ;YEAR MULTIPLE OF 4?
                              14     12   02A1                BNEQ     20$                         ;IF NEQ NO
                              54     D4   02A3                CLRL     R4                          ;CLEAR HIGH PART OF DIVIDEND
   54    53    53   00000064 8F      7B   02A5                EDIV     #100,R3,R3,R4               ;CALCULATE CENTURY AND YEAR IN CENTURY
                              54     D5   02AE                TSTL     R4                          ;YEAR MULTIPLE OF 100?
                              07     12   02B0                BNEQ     30$                         ;IF NEQ NO
                         53   03     D3   02B2                BITL     #3,R3                       ;YEAR MULTIPLE OF 400?
                              02     13   02B5                BEQL     30$                         ;IF EQL YES
                              52     D7   02B7   20$:         DECL     R2                          ;REDUCE NUMBER OF DAYS IN MONTH
                   D0 50      56     F2   02B9   30$:         AOBLSS   R6,R0,10$                   ;ANY MORE DAYS TO ACCUMULATE?
                 50   0184 8F        3C   02BD                MOVZWL   #SS$_IVTIME,R0              ;ASSUME INVALID DAY OF MONTH
                   51      04 A7     3C   02C2                MOVZWL   DAY(R7),R1                  ;GET SPECIFIED DAY
             55     00016FEC 8F      C2   02C6                SUBL     #TIMOFF2,R5                 ;SUBTRACT OUT NUMBER OF DAYS TO 17-NOV-1858
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                   55    51   C0  02CD           ADDL    R1,R5                   ;CALCULATE TOTAL NUMBER OF DAYS
                         57   19  02D0           BLSS    60$                     ;IF LSS INVALID TIME
                   52    51   D1  02D2           CMPL    R1,R2                   ;DAY WITHIN LIMITS?
                         52   1A  02D5           BGTRU   60$                     ;IF GTRU NO
                                  02D7
                                  02D7     ;
                                  02D7     ; CONVERT TIME TO TENTHS OF MICROSECONDS
                                  02D7     ;
                                  02D7
              50      06 A7   3C  02D7     40$:  MOVZWL  HOUR(R7),R0             ;GET HOUR VALUE
               51     08 A7   3C  02DB           MOVZWL  MINUTE(R7),R1           ;GET MINUTE VALUE
         50    51     50 3C   7A  02DF           EMUL    #60,R0,R1,R0            ;CONVERT HOURS TO MINUTES AND SUM
               51     0A A7   3C  02E4           MOVZWL  SECOND(R7),R1           ;GET SECOND VALUE
         50    51     50 3C   7A  02E8           EMUL    #60,R0,R1,R0            ;CONVERT MINUTES TO SECONDS AND SUM
               51     0C A7   3C  02ED           MOVZWL  HUNDREDTH(R7),R1        ;GET HUNDREDTH VALUE
  50   51   50  00000064 8F   7A  02F1           EMUL    #100,R0,R1,R0           ;CONVERT SECONDS TO HUNDREDTHS AND SUM
  50   00   50  000186A0 8F   7A  02FA           EMUL    #100000,R0,#0,R0        ;CONVERT TO TENTHS OF MICROSECONDS
                                  0303
                                  0303     ;
                                  0303     ; CONVERT DAYS TO TENTHS OF MICROSECONDS
                                  0303     ;
                                  0303
  52   00   55  324A9A70 8F   7A  0303           EMUL    #843750000,R5,#0,R2     ;MULTIPLY BY 864000000000/1024
            52     52    0A   79  030C           ASHQ    #10,R2,R2               ;MULTIPLY BY 1024
                                  0310
                                  0310     ;
                                  0310     ; COMBINE RESULTS AND STORE 64-BIT TIME
                                  0310     ;
                                  0310
                   52    50   C0  0310           ADDL    R0,R2                   ;ADD LOW ORDER PARTS
                   53    51   D8  0313           ADWC    R1,R3                   ;ADD HIGH ORDER PARTS
                   50    01   3C  0316           MOVZWL  #SS$_NORMAL,R0          ;SET NORMAL COMPLETION
                      09 58   E8  0319           BLBS    R8,50$                  ;IF LBS ABSOLUTE TIME
                   53    53   CE  031C           MNEGL   R3,R3                   ;CONVERT TO DELTA TIME
                   52    52   CE  031F           MNEGL   R2,R2                   ;
                   53    00   D9  0322           SBWC    #0,R3                   ;
              08 BC      52   7D  0325     50$:  MOVQ    R2,@BTIMADR(AP)         ;STORE 64-BIT TIME VALUE
                              04  0329     60$:  RET                             ;
                         032A          .SBTTL  CONVERT BINARY TIME TO NUMERIC TIME
                         032A  ;+
                         032A  ; EXE$NUMTIM - CONVERT BINARY TIME TO NUMERIC TIME
                         032A  ;
                         032A  ; THIS SERVICE PROVIDES THE CAPABILITY TO CONVERT AN ABSOLUTE OR DELTA TIME
                         032A  ; FROM 64-BIT FORMAT TO INTEGER DATE AND TIME VALUES.
                         032A  ;
                         032A  ; INPUTS:
                         032A  ;
                         032A  ;       NTIMBUF(AP) = ADDRESS OF 7-WORD BUFFER TO RECEIVE CONVERTED DATE AND
                         032A  ;               TIME VALUES.
                         032A  ;       NTIMADR(AP) = ADDRESS OF 64-BIT TIME VALUE. IF ZERO, THEN THE CURRENT
                         032A  ;               SYSTEM TIME IS USED. POSITIVE VALUES ARE INTERPRETED AS
                         032A  ;               ABSOLUTE TIMES AND NEGATIVE VALUES AS DELTA TIMES.
                         032A  ;
                         032A  ; OUTPUTS:
                         032A  ;
                         032A  ;       R0 LOW BIT CLEAR INDICATES FAILURE TO CONVERT TO NUMERIC TIME.
                         032A  ;
                         032A  ;               R0 = SS$_ACCVIO - 64-BIT TIME VALUE CANNOT BE READ BY CALLING
                         032A  ;                       ACCESS MODE OR TIME BUFFER CANNOT BE WRITTEN BY
                         032A  ;                       CALLING ACCESS MODE.
                         032A  ;
                         032A  ;               R0 = SS$_IVTIME - SPECIFIED DELTA TIME IS GREATER THAN 9999
                         032A  ;                       DAYS.
                         032A  ;
                         032A  ;       R0 LOW BIT SET INDICATES SUCCESSFUL COMPLETION.
                         032A  ;
                         032A  ;               R0 = SS$_NORMAL - NORMAL COMPLETION.
                         032A  ;-
                         032A
                         032A  EXE$NUMTIM::                                            ;CONVERT TO NUMERIC TIME
                   00FC  032A          .WORD   ^M<R2,R3,R4,R5,R6,R7>                   ;ENTRY MASK
         57    04 AC  D0  032C         MOVL    NTIMBUF(AP),R7                          ;GET ADDRESS OF 7-WORD TIME BUFFER
                         0330          IFNOWRT #7*2,(R7),10$                           ;CAN TIME BUFFER BE WRITTEN?
            50    01  3C  0336         MOVZWL  #SS$_NORMAL,R0                          ;ASSUME NORMAL COMPLETION
   51   00000000'EF   7D  0339 5$:     MOVQ    EXE$GQ_SYSTIME,R1                       ;ASSUME TIME NOT SPECIFIED
   51   00000000'EF   D1  0340         CMPL    EXE$GQ_SYSTIME,R1                       ;VERIFY THAT THE VALUE ACQUIRED
                  F0  12  0347         BNEQ    5$                                      ; WAS NOT BEING MODIFIED DURING
   52   00000004'EF   D1  0349         CMPL    EXE$GQ_SYSTIME+4,R2                     ; THE ACQUISITION. THIS SYNCHS ACCESS BY
                  E7  12  0350         BNEQ    5$                                      ; THE SECONDARY IN THE 11/782 SYSTEM.
         53    08 AC  D0  0352         MOVL    NTIMADR(AP),R3                          ;GET ADDRESS OF 64-TIME VALUE
                  1C  13  0356         BEQL    20$                                     ;IF EQL NONE SPECIFIED
                         0358          IFNORD  #8,(R3),10$                             ;CAN 64-BIT TIME VALUE BE READ?
            51    63  7D  035E         MOVQ    (R3),R1                                 ;GET 64-BIT TIME VALUE
                  11  18  0361         BGEQ    20$                                     ;IF GEQ ABSOLUTE TIME
            52    52  CE  0363         MNEGL   R2,R2                                   ;NEGATE DELTA TIME VALUE
            51    51  CE  0366         MNEGL   R1,R1                                   ;
            52    00  D9  0369         SBWC    #0,R2                                   ;
         04 50    00  E4  036C         BBSC    #0,R0,20$                               ;INDICATE DELTA TIME VALUE
            50    0C  3C  0370 10$:    MOVZWL  #SS$_ACCVIO,R0                          ;SET ACCESS VIOLATION
                      04  0373         RET                                             ;
                         0374
                         0374  ;
                         0374  ; R1 AND R2 CONTAIN 64-BIT ABSOLUTE TIME VALUE IN UNITS OF TENTHS OF MICRO-
                         0374  ; SECONDS. CALCULATE DAYS PAST BASE TIME AND FRACTION OF DAY BY DIVIDING
                         0374  ; BY 864000000000 WHICH IS THE NUMBER OF TENTHS OF MICROSECONDS IN A DAY.
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                                    0374  ; THE DIVISION IS PERFORMED IN THREE STEPS TO INSURE BOTH QUOTIENT AND
                                    0374  ; REMAINDER STAY WITHIN 32 BITS.
                                    0374  ;
                                    0374  ; CALCULATE DAYS BY DIVIDING BY 1024 AND THEN 843750000. QUOTIENT IS DAYS
                                    0374  ; AND REMAINDER IS FRACTION OF DAY.
                                    0374  ;
                                    0374
          54  51   0A     00    EF  0374  20$:    EXTZV   #0,#10,R1,R4                ;SAVE REMAINDER FROM NEXT DIVIDE
              51   51  F6 8F    79  0379          ASHQ    #-10,R1,R1                  ;DIVIDE BY 1024
      52  51  51   324A9A70 8F  7B  037E          EDIV    #843750000,R1,R1,R2         ;CALCULATE DAYS AND FRACTION OF DAY
                                    0387
                                    0387  ;
                                    0387  ; R1 CONTAINS DAYS PAST BASE TIME, R2 PLUS R4 CONTAIN FRACTION OF DAY.
                                    0387  ; R2 CONTAINS PART OF FRACTION IN UNITS OF 864000000000/1024 AND
                                    0387  ; R4 CONTAINS REMAINDER IN UNITS OF TENTHS OF MICROSECONDS.
                                    0387  ;
                                    0387  ; CALCULATE FRACTION OF DAY IN HUNDREDTHS OF SECONDS BY DIVIDING BY
                                    0387  ; 100000 WHICH IS THE NUMBER OF TENTHS OF MICROSECONDS IN A HUNDRETH
                                    0387  ; OF A SECOND.
                                    0387  ;
                                    0387
                           53   D4  0387          CLRL    R3                          ;CLEAR HIGH PART OF DIVIDEND
              52   52      0A   79  0389          ASHQ    #10,R2,R2                   ;CONVERT BACK TO TENTHS OF MICROSECONDS
                   52      54   C8  038D          BISL    R4,R2                       ;ADD REMAINDER BACK
      52  55  52   000186A0 8F  7B  0390          EDIV    #100000,R2,R5,R2            ;CALCULATE FRACTION OF DAY IN HUNDREDTHS
                                    0399
                                    0399  ;
                                    0399  ; R1 CONTAINS DAYS PAST THE BASE TIME AND R5 CONTAINS THE FRACTION OF DAY
                                    0399  ; IN HUNDREDTHS OF A SECOND.
                                    0399  ;
                                    0399
              7E 50        00   E3  0399          BBCS    #0,R0,70$                   ;IF CLR, DELTA TIME SPECIFIED
                                    039D
                                    039D  ;
                                    039D  ; ADD TIME OFFSET SO THAT DAY IS RELATIVE TO 1-JAN-1501.
                                    039D  ;
                                    039D
              51   0001FE98 8F  C0  039D          ADDL    #TIMOFF1,R1                 ;ADD TIME OFFSET
                                    03A4
                                    03A4  ;
                                    03A4  ; CALCULATE NUMBER OF QUADRICENTURIES THAT HAVE PAST SINCE 1501.
                                    03A4  ;
                                    03A4
                           52   D4  03A4          CLRL    R2                          ;CLEAR HIGH PART OF DIVIDEND
      52  51  51   00023AB1 8F  7B  03A6          EDIV    #QUADRIDAYS,R1,R1,R2        ;CALCULATE NUMBER OF QUADRICENTURIES
                                    03AF
                                    03AF  ;
                                    03AF  ; R1 CONTAINS THE NUMBER OF QUADRICENTURIES AND R2 CONTAINS THE NUMBER OF
                                    03AF  ; DAYS INTO THE NEXT QUADRICENTURY. CALCULATE THE NUMBER OF CENTURIES BY
                                    03AF  ; CONVERTING TO QUARTER DAYS INTO NEXT QUADRICENTURY AND THEN DIVIDING BY
                                    03AF  ; THE AVERAGE NUMBER OF QUARTER DAYS IN A CENTURY.
                                    03AF  ;
                                    03AF
                   52      04   C4  03AF          MULL    #4,R2                       ;CALCULATE NUMBER OF QUARTER DAYS
                           53   D4  03B2          CLRL    R3                          ;CLEAR HIGH PART OF DIVIDEND
      53  52  52   00023AB1 8F  7B  03B4          EDIV    #QDAYSPCENT,R2,R2,R3        ;CALCULATE NUMBER OF CENTURIES
                                    03BD
                                    03BD  ;
                                    03BD  ; R2 CONTAINS THE NUMBER OF CENTURIES AND R3 CONTAINS THE NUMBER OF QUARTER
                                    03BD  ; DAYS INTO THE NEXT CENTURY.
                                    03BD  ;
                                    03BD  ; CALCULATE YEARS BY DISCARDING ANY FRACTION OF A DAY, ADDING 3/4'THS OF A
                                    03BD  ; DAY, AND DIVIDING BY THE AVERAGE NUMBER OF DAYS IN A YEAR. THE LEAP DAY
                                    03BD  ; OF EACH FOUR YEAR CYCLE IS FORCED INTO THE FOURTH YEAR.
                                    03BD  ;
                                    03BD
                          54     D4 03BD              CLRL    R4                      ;CLEAR HIGH PART OF DIVIDEND
                     53   03     C8 03BF              BISL    #3,R3                   ;TRUNCATE FRACTION AND ADD 3/4'THS OF DAY
  54    53    53   000005B5 8F   7B 03C2              EDIV    #QDAYSPYEAR,R3,R3,R4    ;CALCULATE NUMBER OF YEARS
                     54   04     C6 03CB              DIVL    #4,R4                   ;CALCULATE NUMBER OF DAYS MINUS ONE
                          54     D6 03CE              INCL    R4                      ;CONVERT TO ACTUAL JULIAN DAY OF YEAR
                                    03D0
                                    03D0  ;
                                    03D0  ; R1 CONTAINS NUMBER OF QUADRICENTURIES.
                                    03D0  ; R2 CONTAINS NUMBER OF CENTURIES.
                                    03D0  ; R3 CONTAINS NUMBER OF YEARS.
                                    03D0  ; R4 CONTAINS JULIAN DAY OF YEAR.
                                    03D0  ;
                                    03D0  ; CALCULATE ACTUAL YEAR.
                                    03D0  ;
                                    03D0
                   51   6241     DE 03D0              MOVAL   (R2)[R1],R1             ;COMBINE CENTURIES AND QUADRICENTURIES
                     51   32     C4 03D4              MULL    #50,R1                  ;CALCULATE NUMBER OF DOUBLE CENTURIES
              51   05DD C341     3E 03D7              MOVAW   1501(R3)[R1],R1         ;CALCULATE ACTUAL YEAR
                     87   51     B0 03DD              MOVW    R1,(R7)+                ;STORE YEAR
                                    03E0
                                    03E0  ;
                                    03E0  ; TEST FOR NONLEAP YEAR AND BIAS DAY IF AFTER 28-FEB.
                                    03E0  ;
                                    03E0
                     51   03     D3 03E0              BITL    #3,R1                   ;YEAR MULTIPLE OF 4?
                          14     12 03E3              BNEQ    30$                     ;IF NEQ NO
                          52     D4 03E5              CLRL    R2                      ;CLEAR HIGH PART OF DIVIDEND
  52    51    51   00000064 8F   7B 03E7              EDIV    #100,R1,R1,R2           ;CALCULATE CENTURY AND YEAR IN CENTURY
                          52     D5 03F0              TSTL    R2                      ;YEAR MULTIPLE OF 100?
                          0C     12 03F2              BNEQ    40$                     ;IF NEQ NO
                     51   03     D3 03F4              BITL    #3,R1                   ;YEAR MULTIPLE OF 400?
                          07     13 03F7              BEQL    40$                     ;IF EQL YES
                     54   3B     D1 03F9      30$:    CMPL    #31+28,R4               ;AFTER 28-FEB?
                          02     18 03FC              BGEQ    40$                     ;IF GEQ NO
                          54     D6 03FE              INCL    R4                      ;ADJUST FOR TABLE BIAS
                     51   01     D0 0400      40$:    MOVL    #1,R1                   ;INITIALIZE MONTH
              52   FBF7 CF41     9A 0403      50$:    MOVZBL  W^DATETABLE-1[R1],R2    ;GET NUMBER OF DAYS IN MONTH
                     54   52     C2 0409              SUBL    R2,R4                   ;SUBTRACT FROM JULIAN DAY
                          04     15 040C              BLEQ    60$                     ;IF LEQ CORRECT MONTH FOUND
                  F1 51   0C     F3 040E              AOBLEQ  #12,R1,50$              ;LOOP THROUGH ALL MONTHS
                     87   51     B0 0412      60$:    MOVW    R1,(R7)+                ;STORE MONTH
                87   54   52     A1 0415              ADDW3   R2,R4,(R7)+             ;STORE DAY
                          14     11 0419              BRB     80$                     ;
                                    041B
                                    041B  ;
                                    041B  ; DELTA TIME SPECIFIED - STORE RELATIVE DAY
                                    041B  ;
                                    041B
```

```
                         87  D4  041B   751 70$:    CLRL    (R7)+                       ;CLEAR YEAR AND MONTH
                    87   51  B0  041D   752         MOVW    R1,(R7)+                    ;STORE DAY
     51      00002710 8F  D1  0420   753         CMPL    #10000,R1                   ;RELATIVE DAY WITHIN LIMITS?
                         06  1A  0427   754         BGTRU   80$                         ;IF GTRU YES
          50     0184 8F  3C  0429   755         MOVZWL  #SS$_IVTIME,R0              ;SET INVALID TIME
                             04  042E   756         RET                                 ;
                                 042F   757
                                 042F   758 ;
                                 042F   759 ; R5 CONTAINS FRACTION OF DAY IN HUNDREDTHS OF SECONDS.
                                 042F   760 ;
                                 042F   761 ; CALCULATE HOUR, MINUTE, SECOND, AND HUNDREDTH OF SECOND.
                                 042F   762 ;
                                 042F   763
                    57   08  C0  042F   764 80$:    ADDL    #8,R7                       ;POINT TWO BYTES PAST END OF BUFFER
                         51  D4  0432   765         CLRL    R1                          ;CLEAR LOOP INDEX
        52     FC03 CF41  9A  0434   766 90$:    MOVZBL  W^TIMETABLE[R1],R2          ;GET NEXT UNIT DIVISOR
                         56  D4  043A   767         CLRL    R6                          ;CLEAR HIGH PART OF DIVIDEND
     56      55     55   52  7B  043C   768         EDIV    R2,R5,R5,R6                 ;CALCULATE NEXT PART
                    77   56  B0  0441   769         MOVW    R6,-(R7)                    ;STORE NEXT PART
                 EC 51   02  F3  0444   770         AOBLEQ  #2,R1,90$                   ;LOOP FOR HUNDREDTHS, SECONDS, AND MINUTES
                    77   55  B0  0448   771         MOVW    R5,-(R7)                    ;STORE HOUR
                             04  044B   772         RET                                 ;
                                 044C   773
                                 044C   774         .END
```

```
$$T2                           = 00000007
ACVTFLG                        = 00000010
ATIMADR                        = 0000000C
ATIMBUF                        = 00000008
ATIMLEN                        = 00000004
BLANK                          = 00000020
BTIMADR                        = 00000008
BTIMBUF                        = 00000004
CENTURYDAYS                    = 00008EAC
COLON                          = 0000003A
CONVERT                          000001EA R      02
CVRTIME                          0000021C R      02
DATE                             0000003F R      02
DATETABLE                        00000000 R      02
DAY                            = 00000004
DELTA                            0000004D R      02
EXE$ASCTIM                       00000065 RG     02
EXE$BINTIM                       00000106 RG     02
EXE$GQ_SYSTIME                   ********   X    02
EXE$NUMTIM                       0000032A RG     02
HOUR                           = 00000006
HUNDREDTH                      = 0000000C
HYPHEN                         = 0000002D
IVTIME                           000001E4 R      02
MINUTE                         = 00000008
MONTH                          = 00000002
MONTHTAB                         0000000C R      02
NINE                           = 00000039
NTIMADR                        = 00000008
NTIMBUF                        = 00000004
ONE                            = 00000030
PERIOD                         = 0000002E
QDAYSPCENT                     = 00023AB1
QDAYSPYEAR                     = 000005B5
QUADRIDAYS                     = 00023AB1
QUADYEARDAYS                   = 000005B5
SECOND                         = 0000000A
SS$_ACCVIO                     = 0000000C
SS$_IVTIME                     = 00000184
SS$_NORMAL                     = 00000001
SYS$FAO                          ********   X    02
SYS$NUMTIM                       ********  GX    02
TIME                             00000052 R      02
TIMETABLE                        0000003C R      02
TIMOFF1                        = 0001FE98
TIMOFF2                        = 00016FEC
YEAR                           = 00000000


                                                +----------------+
                                                ! Psect synopsis !
                                                +----------------+

PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
.  ABS  .                       00000000  (     0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
$ABS$                           00000000  (     0.)  01 (  1.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD     WRT NOVEC BYTE
Y$EXEPAGED                      0000044C  (  1100.)  02 (  2.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD     WRT NOVEC BYTE
```

```
                                     +--------------------------+
                                     ! Performance indicators !
                                     +--------------------------+

Phase                     Page faults    CPU Time       Elapsed Time
-----                     -----------    --------       ------------
Initialization                     29    00:00:00.08    00:00:01.01
Command processing                110    00:00:00.58    00:00:04.22
Pass 1                            232    00:00:05.96    00:00:20.69
Symbol table sort                   0    00:00:00.68    00:00:02.58
Pass 2                            143    00:00:01.89    00:00:05.95
Symbol table output                 8    00:00:00.07    00:00:00.32
Psect synopsis output               1    00:00:00.02    00:00:00.02
Cross-reference output              0    00:00:00.00    00:00:00.00
Assembler run totals              525    00:00:09.28    00:00:34.79

The working set limit was 1500 pages.
34724 bytes (68 pages) of virtual memory were used to buffer the intermediate code.
There were 30 pages of symbol table space allocated to hold 451 non-local and 39 local symbols.
774 source lines were read in Pass 1, producing 15 object records in Pass 2.
14 pages of virtual memory were used to define 12 macros.

                                    +----------------------------+
                                    ! Macro library statistics !
                                    +----------------------------+

Macro library name                                Macros defined
------------------                                --------------
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                                 2
_$255$DUA28:[SYSLIB]STARLET.MLB;2                              7
TOTALS (all libraries)                                         9

505 GETS were required to define 9 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:SYSCVRTIM/OBJ=OBJ$:SYSCVRTIM MSRC$:SYSCVRTIM/UPDATE=(ENH$:SYSCVRTIM)+EXECML$/LIB
```

0383 AH-BT13A-SE
VAX/VMS V4.0

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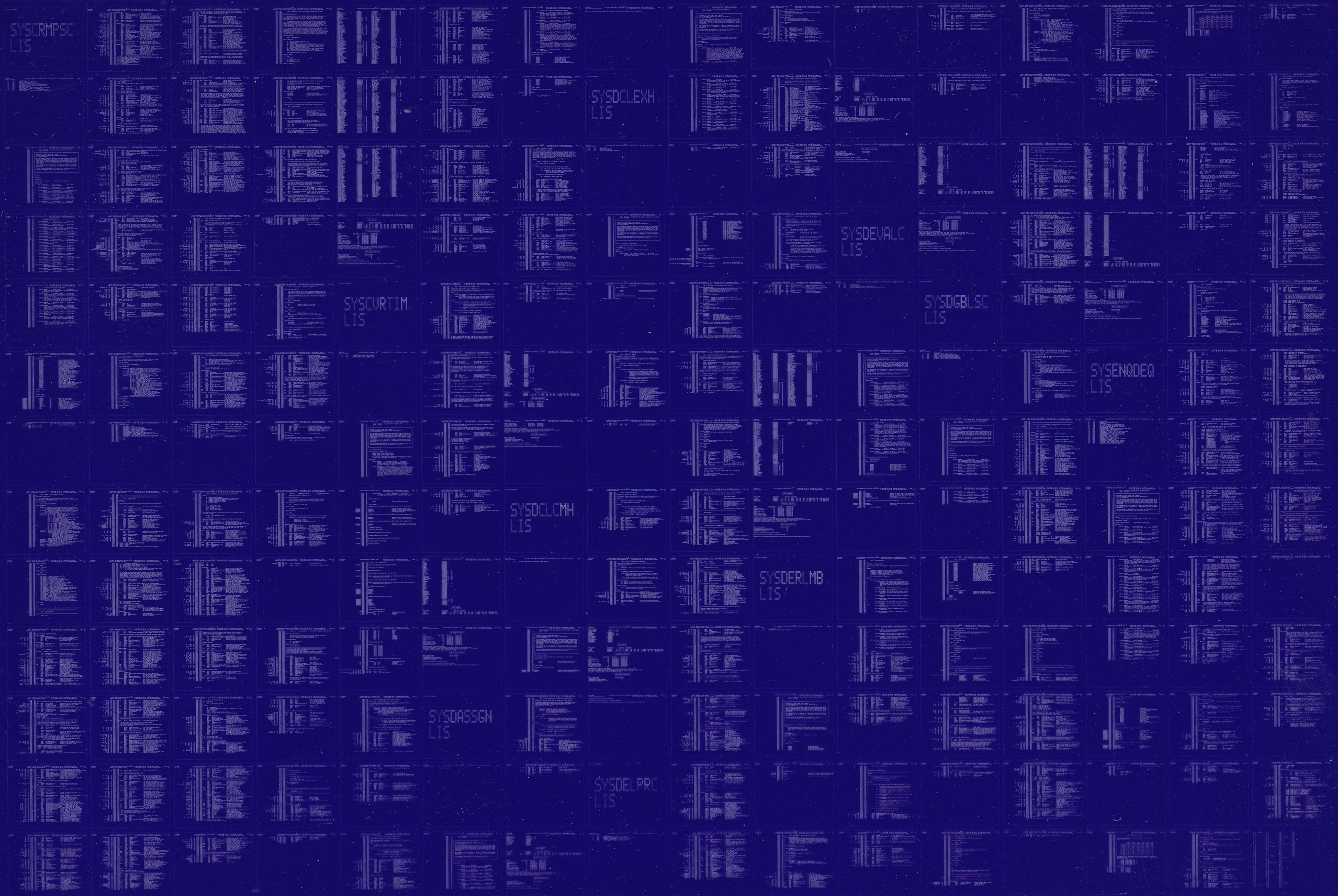

SYSCRMPSC
LIS

SYSDCLEXH
LIS

SYSDEVALC
LIS

SYSCVRTIM
LIS

SYSDGBLSC
LIS

SYSENQDEQ
LIS

SYSDCLCMH
LIS

SYSDERLMB
LIS

SYSDASSGN
LIS

SYSDELPRC
LIS